

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
10 February 2005 (10.02.2005)

PCT

(10) International Publication Number  
**WO 2005/013468 A1**

(51) International Patent Classification<sup>7</sup>: **H02M 3/22**,  
3/02, 7/02

[NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven  
(NL).

(21) International Application Number:  
PCT/IB2004/051283

(72) Inventors; and

(22) International Filing Date: 22 July 2004 (22.07.2004)

(75) Inventors/Applicants (for US only): **ELFERICH, Reinhold** [DE/DE]; c/o Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE). **DÜRBAUM, Thomas** [DE/DE]; c/o Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE). **TOLLE, Tobias, Georg** [DE/DE]; c/o Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE). **GROVER, Raymond, Jeremy** [GB/DE]; c/o Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE). **RUTTER, Phillip** [GB/DE]; c/o Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE).

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
03102401.1 1 August 2003 (01.08.2003) EP

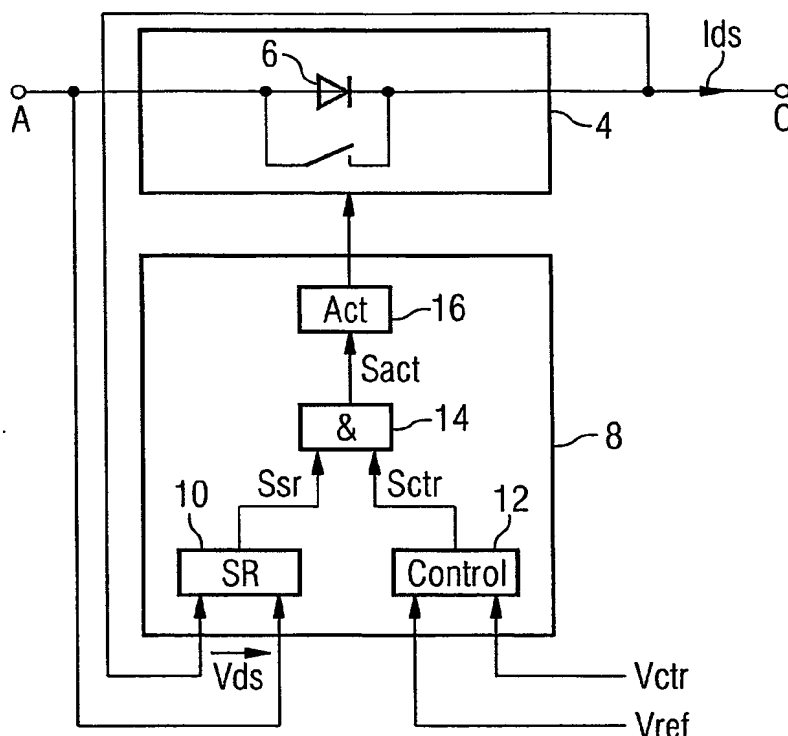
(71) Applicant (for DE only): **PHILIPS INTELLECTUAL PROPERTY & STANDARDS GMBH** [DE/DE]; Stein-  
damm 94, 20099 Hamburg (DE).

(71) Applicant (for all designated States except DE, US):  
**KONINKLIJKE PHILIPS ELECTRONICS N. V.**

(74) Agent: **MEYER, Michael**; Philips Intellectual Property & Standards GmbH, Weissshausstr. 2, 52066 Aachen (DE).

[Continued on next page]

(54) Title: OUTPUT VOLTAGE CONTROL OF A SYNCHRONOUS RECTIFIER



(57) Abstract: The trend towards more digital signal processing in mains-powered devices causes an increasing variety of supply voltages at ever decreasing levels and at higher currents. At present, the secondary side architecture provides a separate ac-dc conversion and dc-dc down-conversion stages in order to obtain stabilized voltages at those low levels. According to the present invention, a controlling synchronous rectifier is provided, comprising a power MOSFET and a control unit which allow to integrate both stages. In particular, according to the present invention, the output voltage of the synchronous rectifier is controlled by controlling the channel switching of the MOSFET. Advantageously, this provides for a very simple and efficient rectification and voltage control.



(81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH,

GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*